



<http://drought.mt.gov>

Map Key

Continental Divide

Drought Impact Type

Drought Status

April 2011

- Moist
- No Drought
- Slightly Dry
- Moderately Dry (Drought Alert)
- Severely Dry
- Extremely Dry (Severe Drought)

Drought Impact Types -

- A** = Agricultural - Soil Moisture, Range conditions
- H** = Hydrological - Water Supplies, Streamflow, Groundwater

Drought Alert - Governor's Drought

Advisory Committee strongly encourages local officials to convene local drought committees.

Severe Drought - Local officials

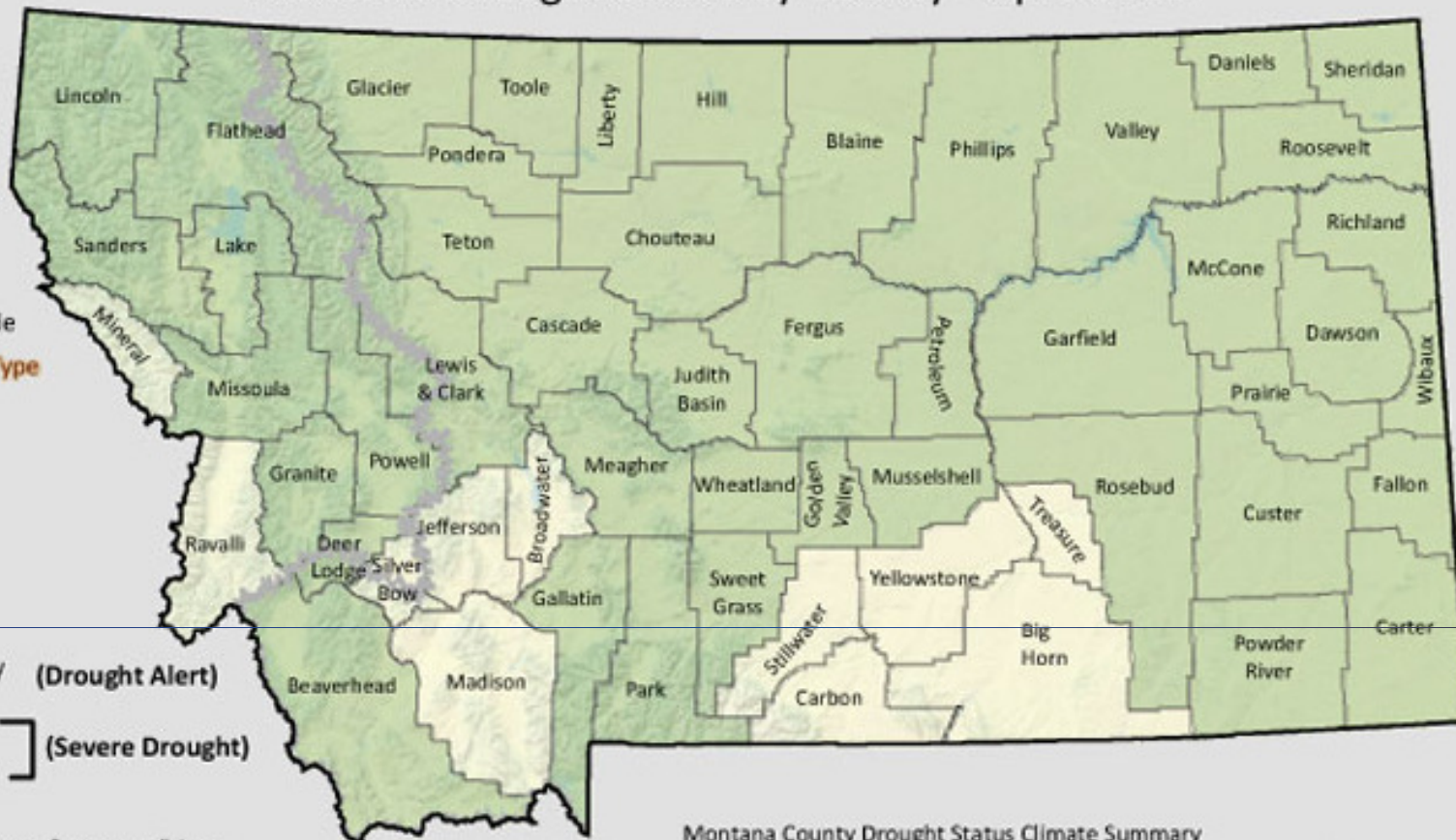
should have local drought planning efforts underway or should reconvene the local drought committee at the earliest opportunity.

For recommended responses, see the Montana Drought Plan



<http://nris.mt.gov/drought/>

Montana Drought Status by County - April 2011



Montana County Drought Status Climate Summary

With under two weeks of winter remaining and just over one month of mountain snowpack snow water content accumulation remaining for Montana, the snow water equivalent of 17 of the state's major river basins ranges from about 105- to 125-percent of the 30-year average 1971-2000. According to NRCS National Water and Climate Center, February was the fourth consecutive month of above average mountain precipitation. The NRCS March 30, 2011 Surface Water Supply Index (SWSI) map indicates that all of the 54 river basins included are rated as Near Average to Extremely Wet with more than two-third of the total basins ranging from Slightly Wet to Extremely Wet. See: http://nris.mt.gov/NRCS/Mar11/SWSI/swsi03_11.pdf

The March 10, 2011 El Niño/Southern Oscillation (ENSO) Diagnostic Discussion from the Climate Prediction Center (CPC) concludes that the ongoing La Niña climate anomaly event dating from early fall 2010 is weakening which is typical for ENSO events which influence Montana climate from November through April. After spring the CPC climate model suite (Fig. 6) is inconclusive for ENSO trends. See: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensodisc.pdf

The CPC one-month climate outlook for March issued February 28 calls for a 40- to 50-percent chance of colder than normal temperatures and above normal precipitation for Montana east of the Continental Divide, and a 50 percent or better chance for same west of the Divide. The March-April-May climate outlook calls for a 40 percent chance or better for cooler than average temperatures for most of the state, while precipitation is forecast to be within the normal range of climatology. A strong winter temperature anomaly ranging from 4- to 10- F. degrees colder than normal conditions has persisted since fall for the NE and HI-line regions of the state. See: <http://www.wroc.drl.edu/cgi-bin/anomimage.pl?mon0301ndep.gif>

The March 9 U.S. Geological Survey water supply report reported that streamflow and reservoir contents statewide continued to range between normal to above normal for the month of February. Due to an above average mountain snowpack late in the historic accumulation period, the strong water supply outlook forecasted by NRCS, and the normal to well above normal surface water conditions as depicted on the SWSI map for reservoir storage, soil moisture and streamflow, the Drought Committee designated all counties to be within the No Drought category except for six counties west of the Divide and 22 counties east of the Divide designated as Moist as of March 1. Concerns at this time are for damage or loss from localized flooding from anomalously warm periods and survivability of newborn livestock in the eastern and northern regions of the state. See National Weather Service experimental newborn livestock tool:

<http://www.wrhi.noaa.gov/tbx/can/canl.php>



Montana Drought Status map category Assessment Guidelines
Precipitation and SWSI Referencing
March 2011

Green – (#0) "Moist" (Above Average).

NWS Precip. Maps Crop year Precip > 120 percent; Water Year (WY) Precip 115-to 120 percent; SWSI to be at least +1.0 or not factor for county; US Drought Monitor – NA.

Buff – (#1) "No Drought" (Near Average)

NWS Crop Year Precip 90- to 120 percent; WY Precipitation 85 – 115 percent; SWSI to be -1.0 to +1.0; PHDI is -0.5 to +0.5; USDMD – No value.

Yellow – (#2) "Slightly Dry" – NWS Crop year precip 80- to 90 percent & Water Year Precipitation 75 to 85 percent; SWSI -1.0 to -1.9 Slightly Dry; PHDI -0.5 to -2.0; USDMD - D0 Abnormally Dry.

Orange – (#3) "Moderately Dry" – (Drought Alert)*; NWS Crop Year precipitation 65- to 80 percent; WY Precip- 60 to 75 percent; SWSI -2.0 to -2.9; PHDI -2.0 to -3.0; USDMD - D1 Moderate.

Red – (#4) Severely Dry – (Severe Drought)* NWS Crop Year precip 55 to 65 percent; WY Precip – 50 to 60 percent; SWSI -3.0 to -3.4 Extremely Dry; PHDI -3.0 to -3.4; USDMD - D2 Severe to D3 Extreme.

Brown – (#5) - Extremely Dry – (Severe Drought)* NWS Crop Year precipitation < 55 percent; WY < 50 percent; SWSI -3.5 to -4.0; PHDI - 3.5 to - 4.0 and less (worse); USDMD – D3 Extreme to D4 Exceptional.

The assessment team also considers soil moisture and crop condition information from county extension agents, the NASS Weekly Crop-Weather Report, the Standardized Precipitation Index (SPI), the Drought Monitor Short- and Long-term blend maps, and any other credible data indicating trends or changes in moisture and water supply conditions in the state.

* Refers to the two levels of response in the Montana Drought Plan.



Water Outlook Meeting Spring 2011

Western Montana

by

Ray Nickless (Service Hydrologist – Missoula, MT)

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La Nina - Measured



70 Ocean Buoys



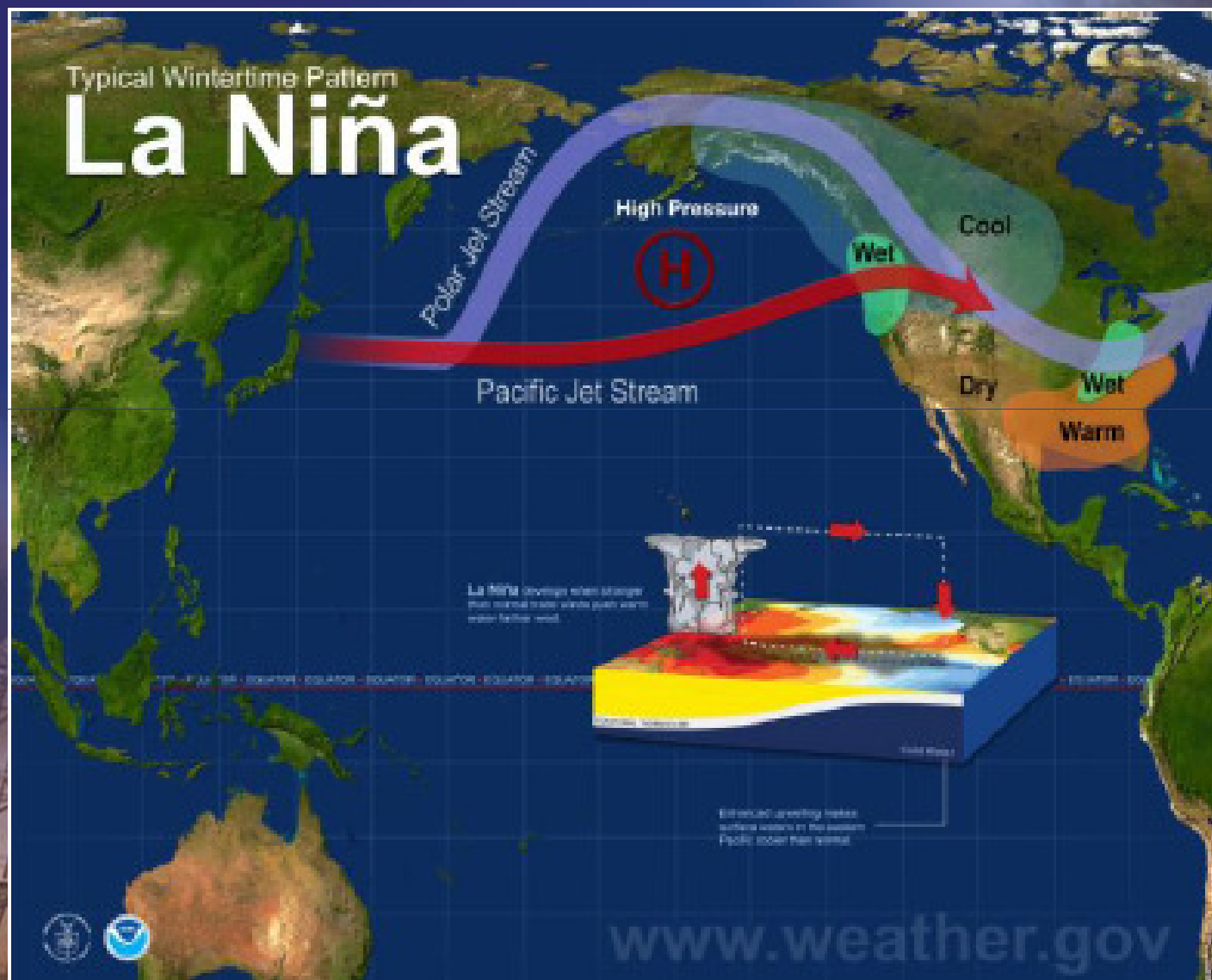
Weather Balloons

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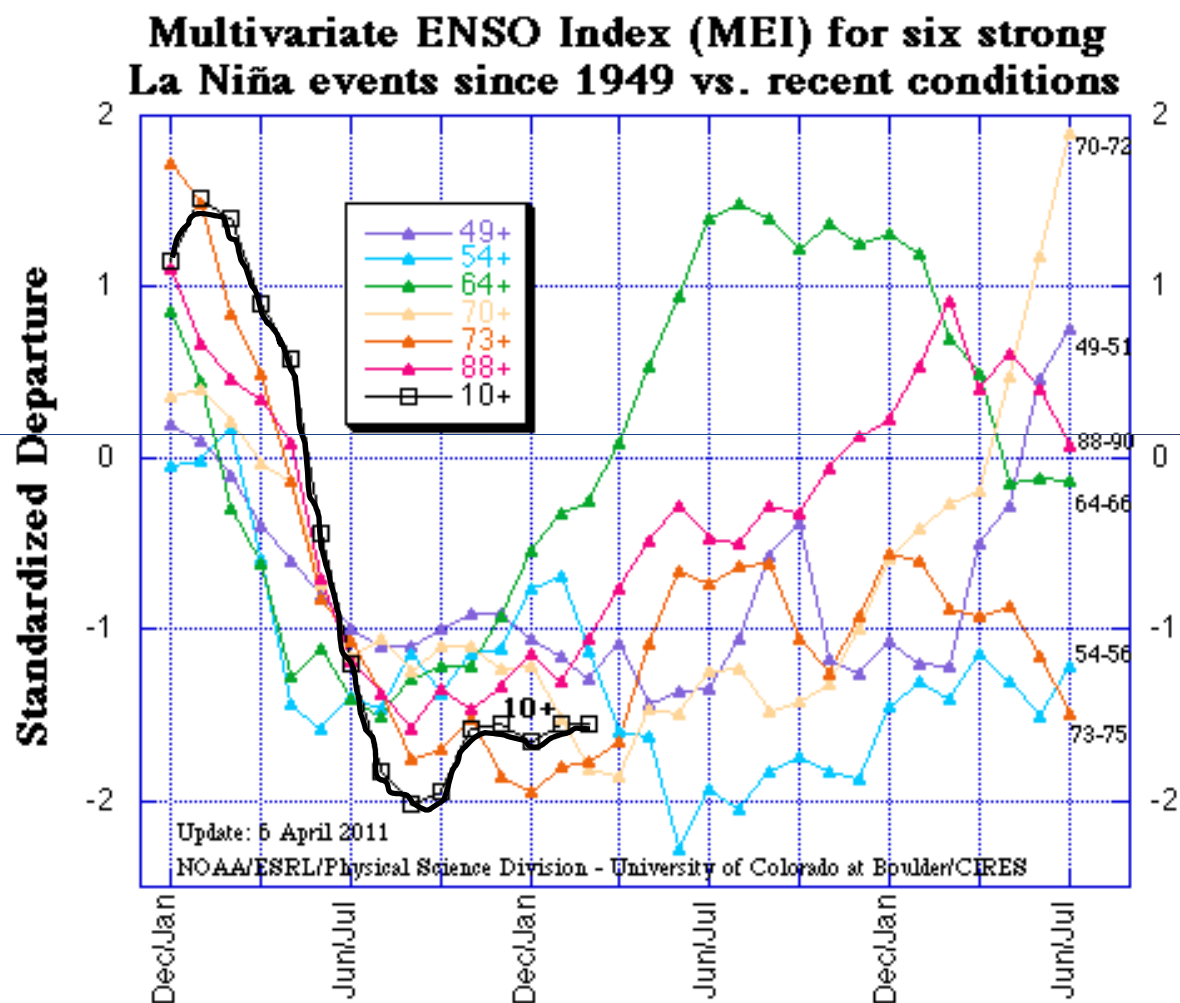


La Nina 2010 - 2011





La Nina 2010 – 2011 (*Historical Comparison*)





Precipitation & Temperature

2011 - Water year

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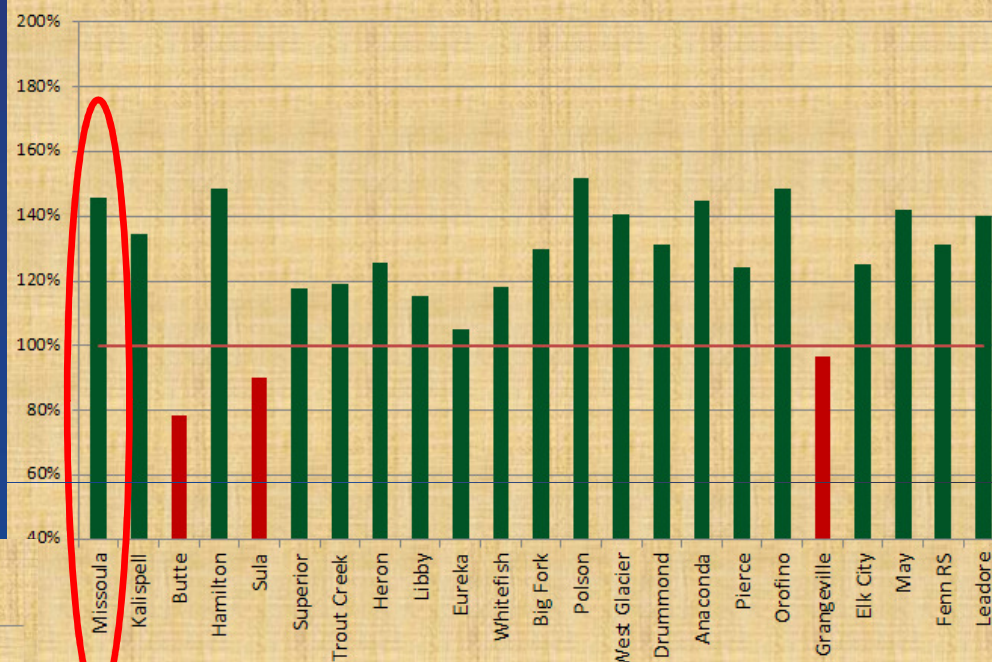
NOAA National Weather Service



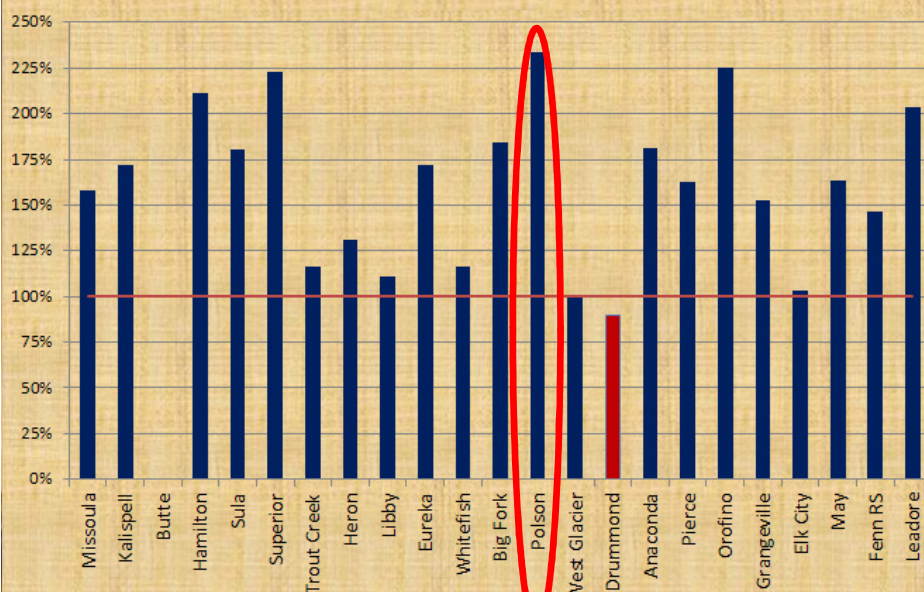
Precipitation

Snowfall

Precipitation Totals
Oct - Mar 2010/11



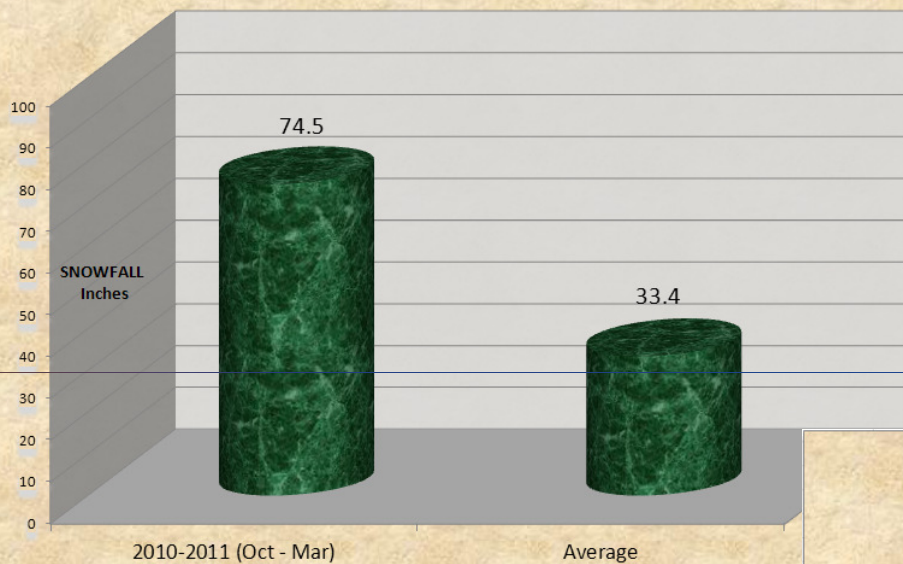
Snowfall percent of normal
Oct - Mar 2010/11





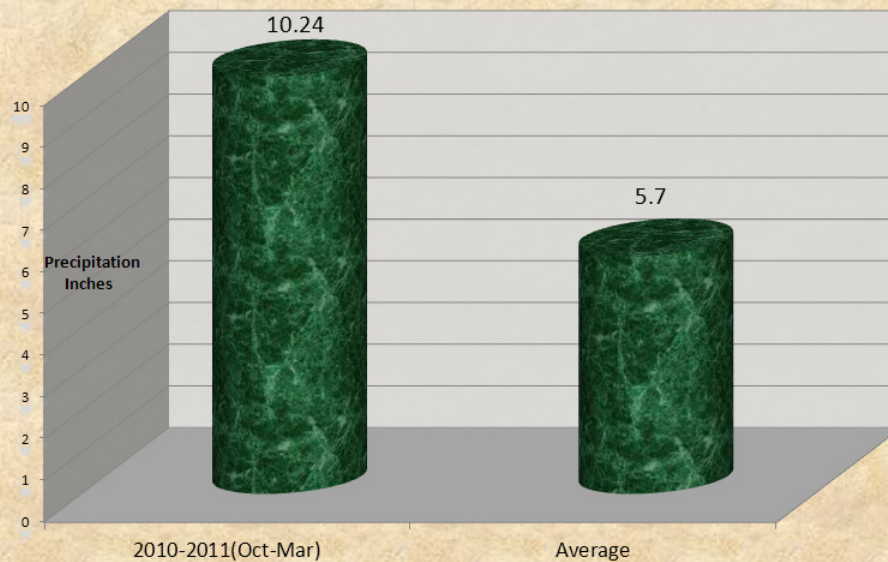
Snowfall (*Polson*)

POLSON KERR DAM - SNOWFALL OCT(2010) THRU MAR (2011)



Precipitation (*Polson*)

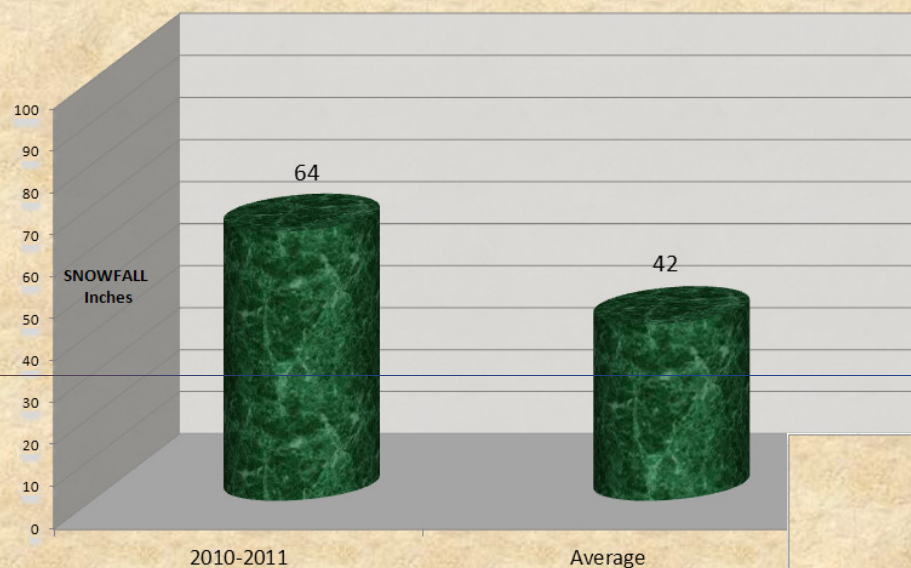
POLSON KERR DAM - PRECIPITATION OCT(2010) THRU MAR (2011)





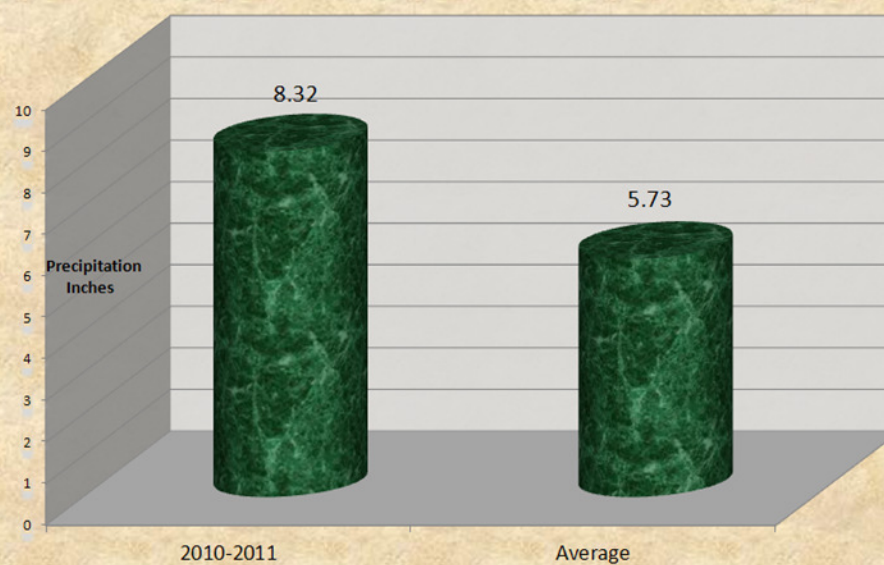
Snowfall (Missoula)

MISSOULA - SNOWFALL OCT(2010) THRU MARCH (2011)



Precipitation (Missoula)

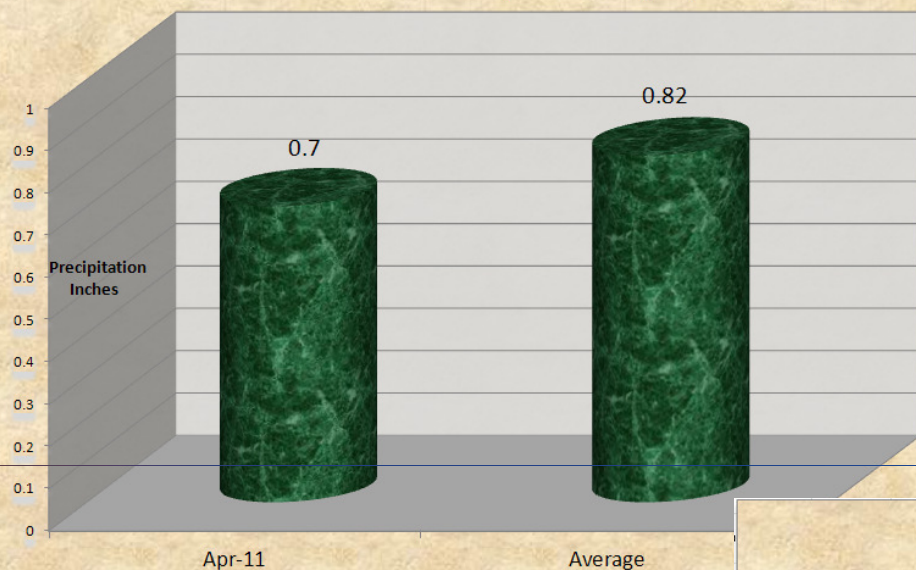
MISSOULA- PRECIPITATION OCT(2010) THRU MARCH (2011)



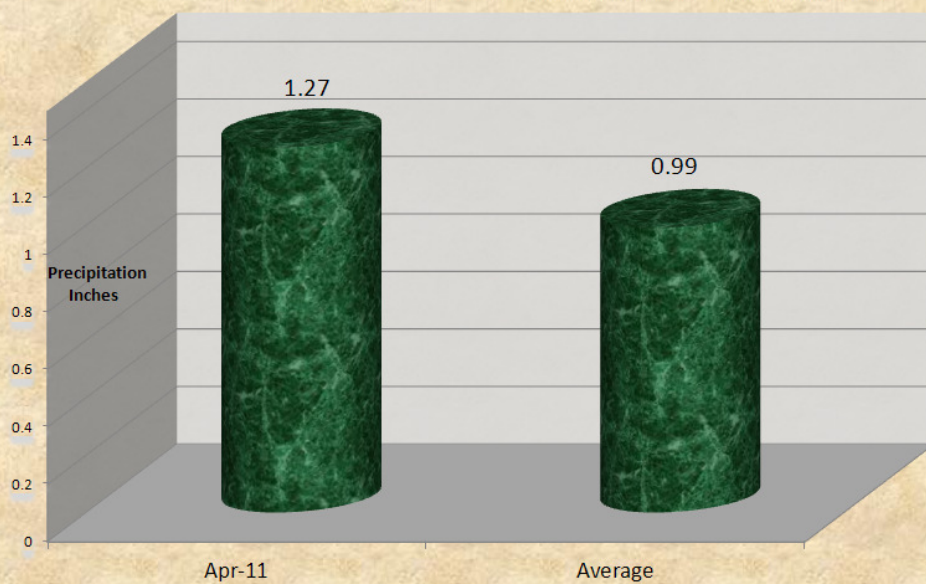


April Precipitation

MISSOULA- PRECIPITATION April 1 through April 24 (2011)



KALISPELL PRECIPITATION April 1 THRU April 24 (2011)

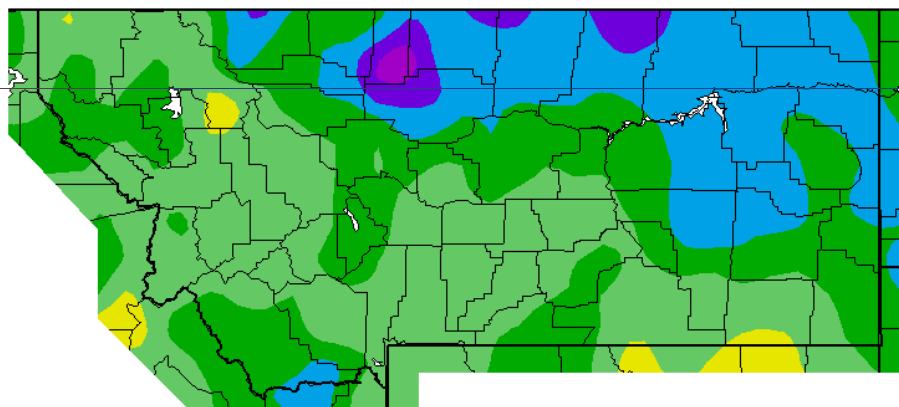




Temperatures (October through late- April)

Maximum Temps

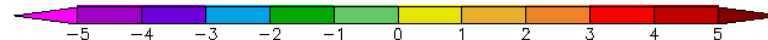
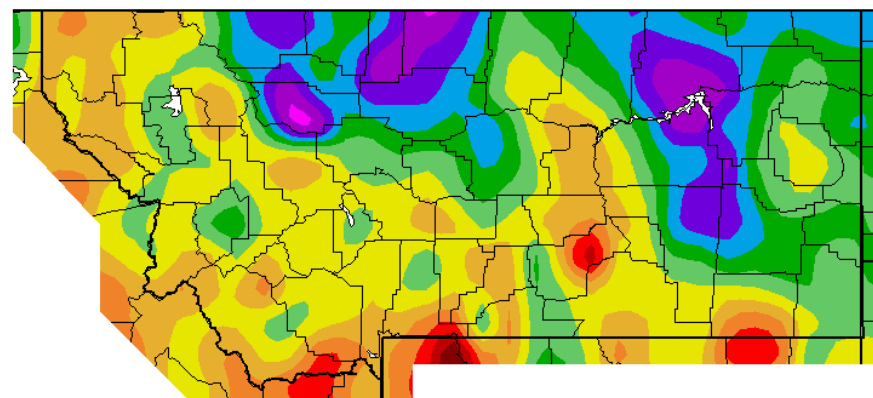
Av. Max. Temperature dep from Ave (deg F)
10/1/2010 – 4/22/2011



Generated 4/23/2011 at WRCC using provisional data.
NOAA Regional Climate Centers

Minimum Temps

Av. Min. Temperature dep from Ave (deg. F)
10/1/2010 – 4/22/2011



Generated 4/23/2011 at WRCC using provisional data.
NOAA Regional Climate Centers



April (Temps in Missoula)

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: MISSOULA MT
MONTH: APRIL
YEAR: 2011
LATITUDE: 46 55 N
LONGITUDE: 114 5 W

TEMPERATURE IN F:					:PCPN:			SNOW:		WIND		:SUNSHINE:			SKY		:PK WND		
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18	
									12Z	AVG	MX	2MIN							
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR	
=====																			
1	58	41	50	8	15	0	0.01	0.0	0	2.4	13	230	M	M	7		20	220	
2	47	33	40	-2	25	0	0.26	T	0	8.6	26	260	M	M	8	1	35	260	
3	44	31	38	-4	27	0	0.08	1.8	0	4.8	20	10	M	M	9	1	25	350	
4	46	30	38	-5	27	0	0.02	0.0	0	2.2	10	50	M	M	8		13	50	
5	48	36	42	-1	23	0	0.05	T	0	12.0	12	200	M	M	6		16	260	
6	46	33	40	-3	25	0	T	T	0	6.8	23	270	M	M	9		26	270	
7	46	24	35	-8	30	0	0.00	0.0	0	5.2	21	40	M	M	5		25	50	
8	46	30	38	-6	27	0	0.00	0.0	0	8.8	8	280	M	M	10	8	9	280	
9	52	25	39	-5	26	0	0.00	0.0	0	6.0	23	280	M	M	7		26	270	
10	50	34	42	-2	23	0	0.00	0.0	0	6.4	16	270	M	M	9		24	290	
11	50	31	41	-3	24	0	T	0.0	0	8.4	14	240	M	M	7		21	240	
12	52	27	40	-5	25	0	0.00	0.0	0	2.3	12	20	M	M	4		15	20	
13	58	28	43	-2	22	0	0.12	0.0	0	6.2	21	340	M	M	6	1	33	310	
14	47	34	41	-4	24	0	T	T	0	10.2	10	150	M	M	5		13	150	
15	53	34	44	-1	21	0	T	T	0	5.7	18	270	M	M	8		24	210	
16	58	39	49	3	16	0	T	0.0	0	8.1	28	240	M	M	8		37	260	
17	49	37	43	-3	22	0	T	0.0	0	12.6	26	230	M	M	7		33	220	
18	46	25	36	-10	29	0	0.02	T	0	5.3	12	350	M	M	6	18	13	350	
19	41	25	33	-13	32	0	0.03	0.2	0	5.0	25	280	M	M	7	8	32	280	
20	55	19	37	-10	28	0	0.00	0.0	0	4.6	18	40	M	M	3		23	40	
21	46	27	37	-10	28	0	T	0.0	0	7.8	29	320	M	M	8		33	320	
22	49	28	39	-8	26	0	T	0.0	0	4.2	7	340	M	M	7	18	8	330	
23	57	23	40	-7	25	0	0.00	0.0	0	2.1	13	280	M	M	0		28	90	
=====																			
SM	1144	694			570	0	0.59		2.0	145.7			M		154				
=====																			
AV	49.7	30.2								6.3	FASTST		M	M	7		MAX (MPH)		
MISC ---->										#	29	320					#	37	260

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National Weather Service



April (Temps in Kalispell)

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: KALISPELL MT
MONTH: APRIL
YEAR: 2011
LATITUDE: 48 17 N
LONGITUDE: 114 16 W

TEMPERATURE IN F:					:PCPN:			SNOW:		WIND		:SUNSHINE:		SKY		:PK WND						
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18				
									12Z	AVG	MX	2MIN										
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR				
1	49	32	41	1	24	0	0.10	0.0	0	3.9	17	160	M	M	9	1	22	130				
2	48	31	40	0	25	0	0.31	1.0	0	9.8	25	240	M	M	9	1	32	220				
3	46	23	35	-5	30	0	T	0.0	1	4.8	14	30	M	M	5	8	18	40				
4	46	34	40	0	25	0	0.08	T	0	11.7	21	150	M	M	9	18	25	150				
5	47	32	40	-1	25	0	0.06	T	0	9.2	24	220	M	M	8	12	31	240				
6	48	32	40	-1	25	0	0.01	T	0	9.5	21	150	M	M	8		28	220				
7	49	22	36	-5	29	0	0.00	0.0	0	6.6	21	80	M	M	2		25	80				
8	51	27	39	-3	26	0	0.00	0.0	0	7.2	20	30	M	M	2		23	30				
9	53	21	37	-5	28	0	0.00	0.0	0	4.0	16	280	M	M	4		21	280				
10	52	36	44	2	21	0	0.00	0.0	0	8.9	10	150	M	M	10		14	160				
11	54	34	44	2	21	0	T	0.0	0	13.2	31	270	M	M	7		43	260				
12	49	24	37	-6	28	0	0.00	0.0	0	5.3	15	160	M	M	1		25	160				
13	59	23	41	-2	24	0	0.31	0.0	0	4.2	16	160	M	M	4	1	29	250				
14	48	35	42	-1	23	0	0.04	0.0	0	11.4	24	230	M	M	7		31	230				
15	50	35	43	-1	22	0	0.03	T	0	11.9	24	150	M	M	8	1	40	330				
16	54	36	45	1	20	0	0.04	0.0	0	6.8	23	340	M	M	9		40	330				
17	41	30	36	-8	29	0	0.20	T	0	6.1	22	360	M	M	9	128	36	340				
18	43	28	36	-8	29	0	0.01	0.2	T	7.0	16	20	M	M	9	1	20	20				
19	39	25	32	-13	33	0	0.05	0.1	0	4.8	15	120	M	M	7	1	18	120				
20	49	24	37	-8	28	0	0.00	0.0	0	4.3	15	200	M	M	6	12	20	200				
21	46	34	40	-5	25	0	0.03	T	0	4.0	15	170	M	M	9	18	18	240				
22	46	30	38	-8	27	0	T	M	0	3.9	13	180	M	M	8	18	15	180				
23	53	25	39	-7	26	0	0.00	0.0	0	4.3	14	180	M	M	4	1	18	150				
SM	1120	673			593	0	1.27		1.3	162.8			M		154							
AV	48.7	29.3								7.1	FASTST		M	M	7		MAX (MPH)					
										MISC	----	#	31	270						#	43	260








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Current Missoula Forecast

Forecast at a Glance

Tuesday	Tuesday Night	Wednesday	Wednesday Night	Thursday	Thursday Night	Friday
						
Chance Rain/Snow	Mostly Cloudy	Mostly Sunny	Chance Showers	Showers Likely	Chance Snow	Chance Rain/Snow
Hi 49 °F	Lo 32 °F	Hi 53 °F	Lo 35 °F	Hi 50 °F	Lo 30 °F	Hi 48 °F

Average high temps = 61 to 62 deg F



Weekend Missoula Forecast

Saturday: A slight chance of showers. **Partly sunny**, with a high near 52.

Saturday Night: A slight chance of showers. Partly cloudy, with a low around 32.

Sunday: **Mostly sunny**, with a high near 55.

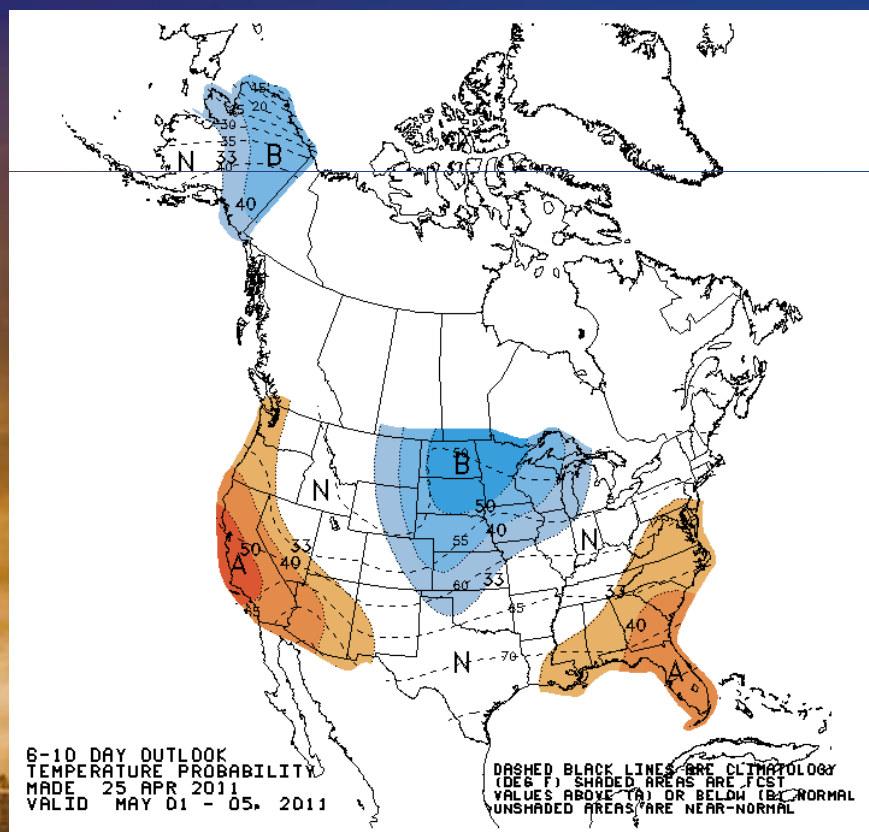
Sunday Night: Partly cloudy, with a low around 32.

Monday: **Mostly sunny**, with a high near 59.

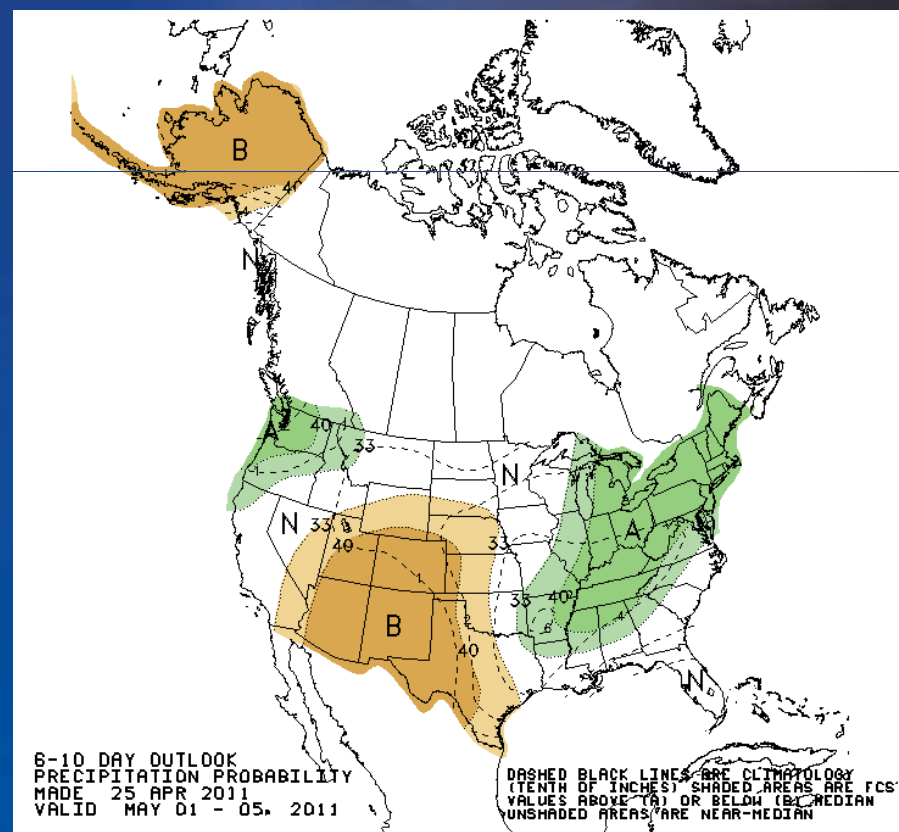


May 1st thru May 5th Weather Outlook

Temperature



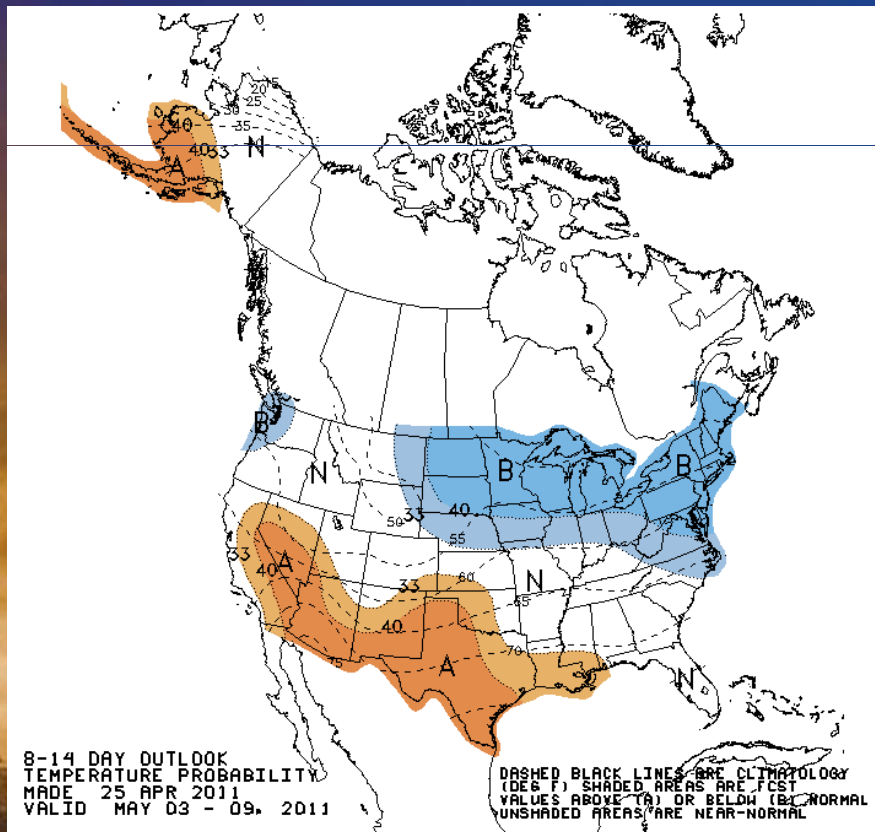
Precipitation



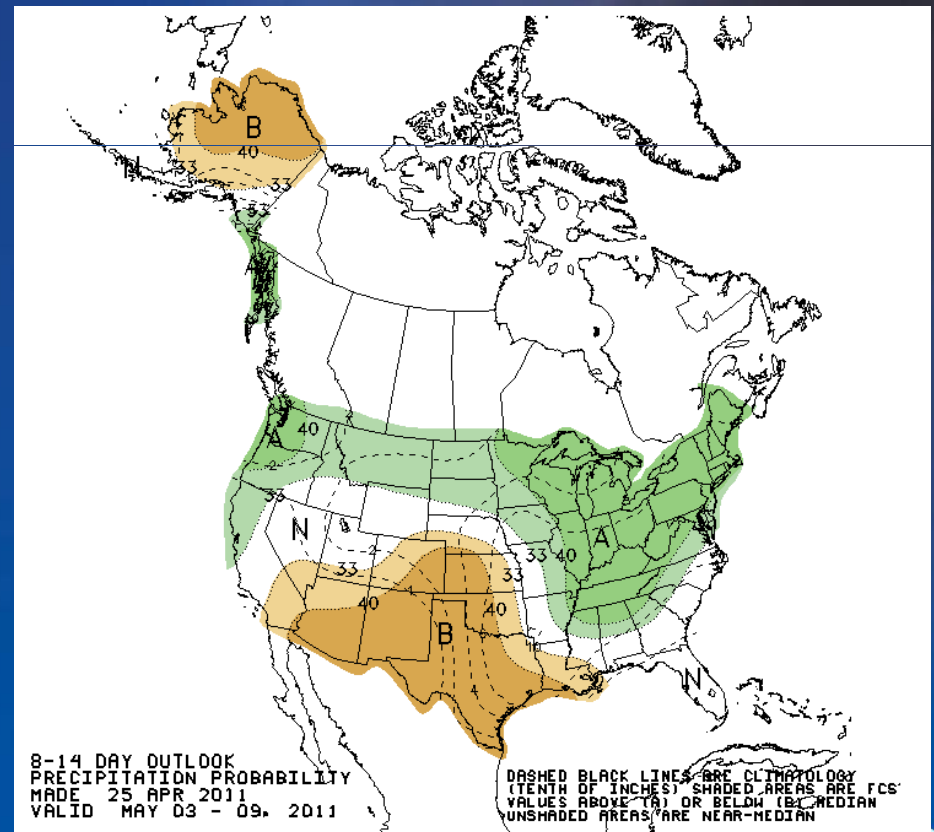


May 3rd thru May 9th Weather Outlook

Temperature



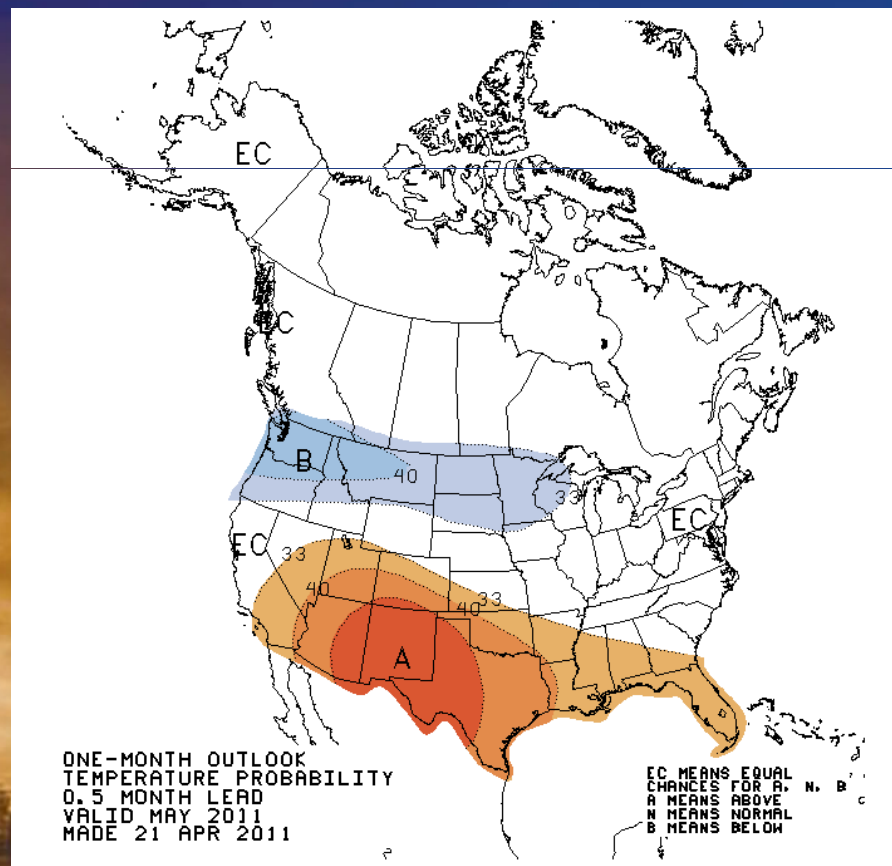
Precipitation



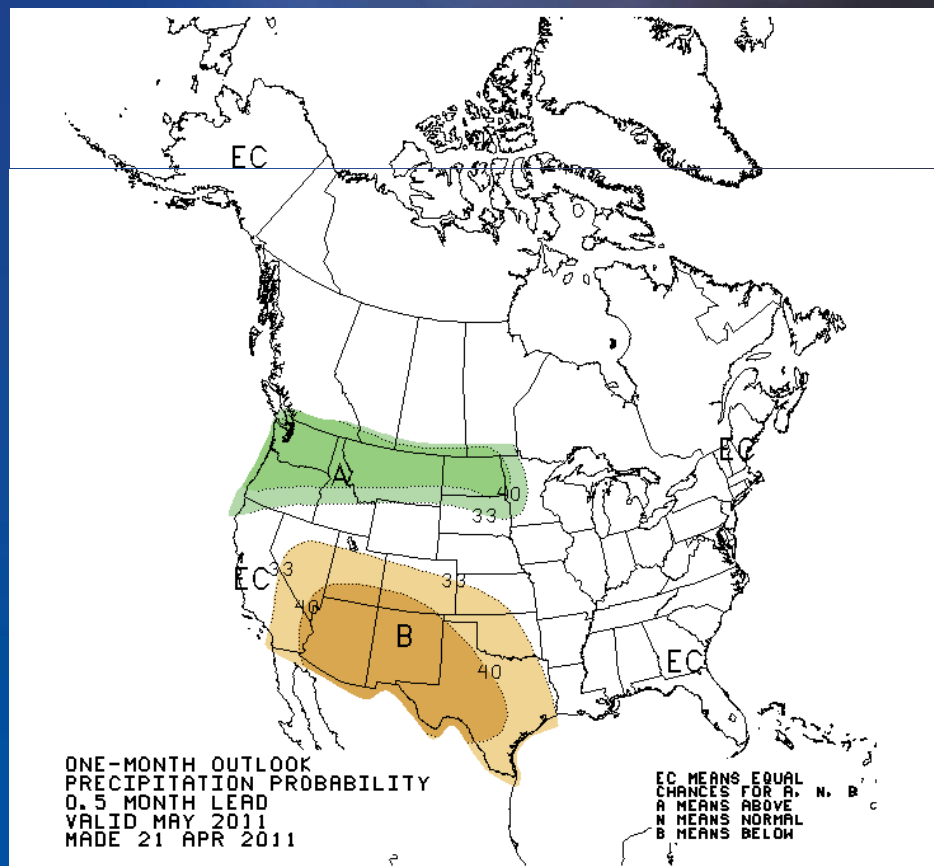


May Weather Outlook

Temperature



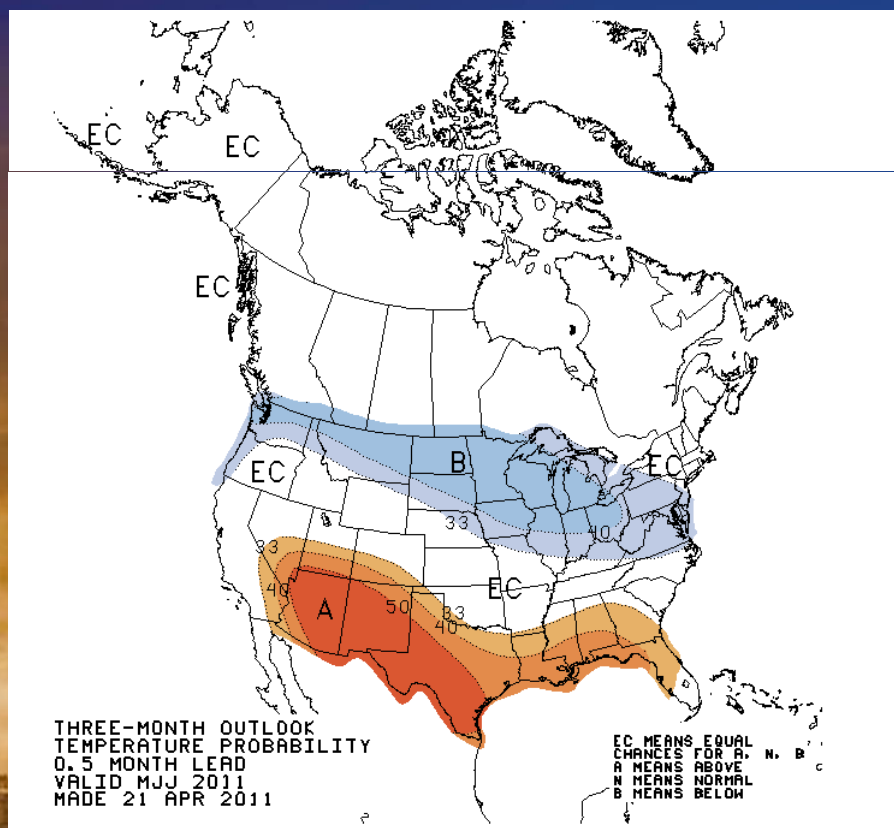
Precipitation



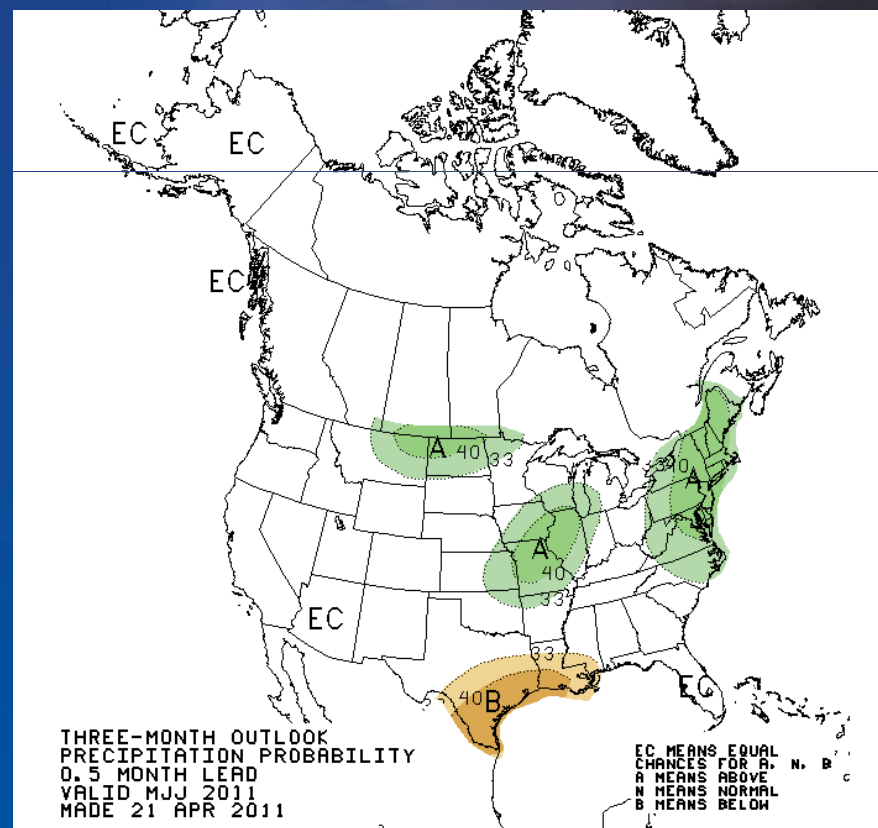


May-June-July Weather Outlook

Temperature



Precipitation

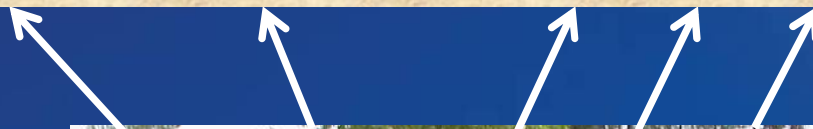
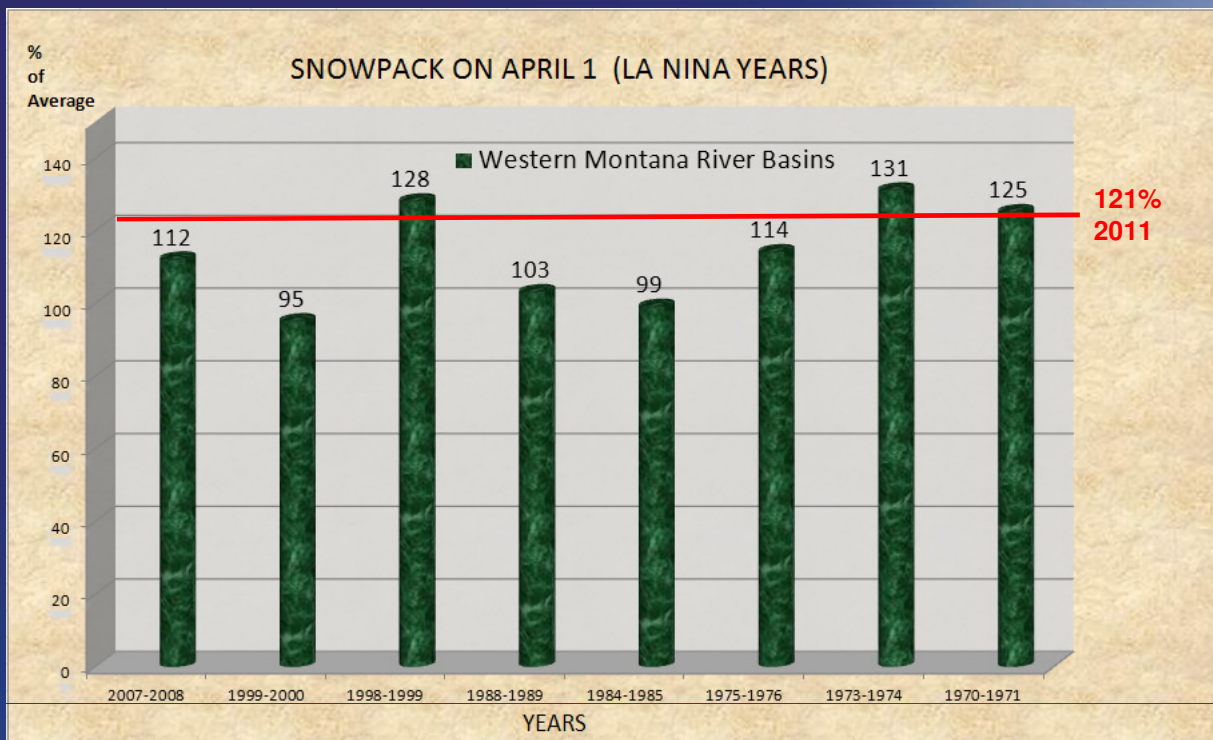




Flood Potential for Spring 2011

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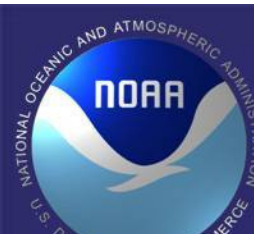
NOAA National Weather Service



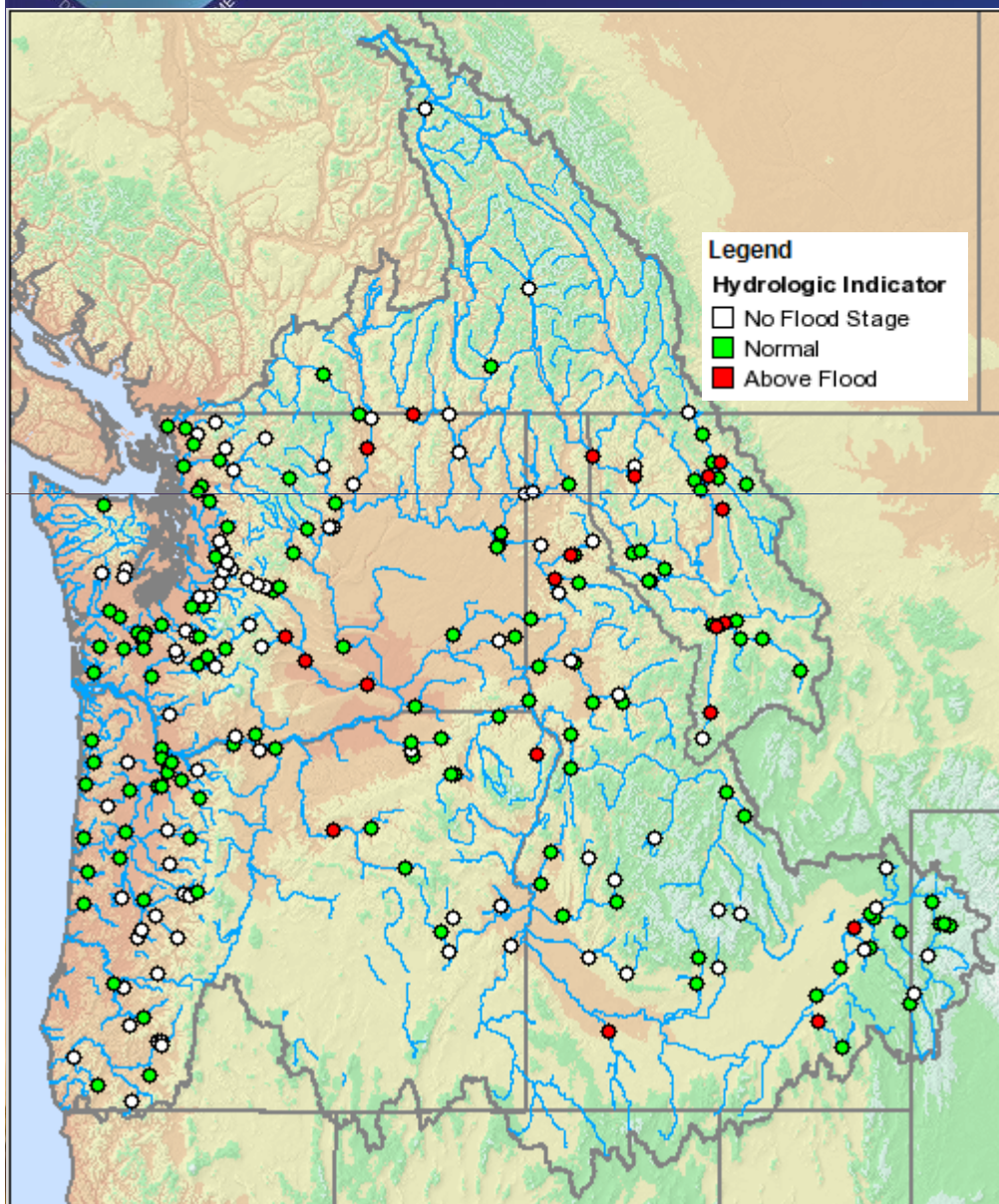
Western Montana

River and small creek flooding
5 of 8 La Nina years all of which
were above normal snowpack

NOAA National Weather Service



Peakflow Forecasts



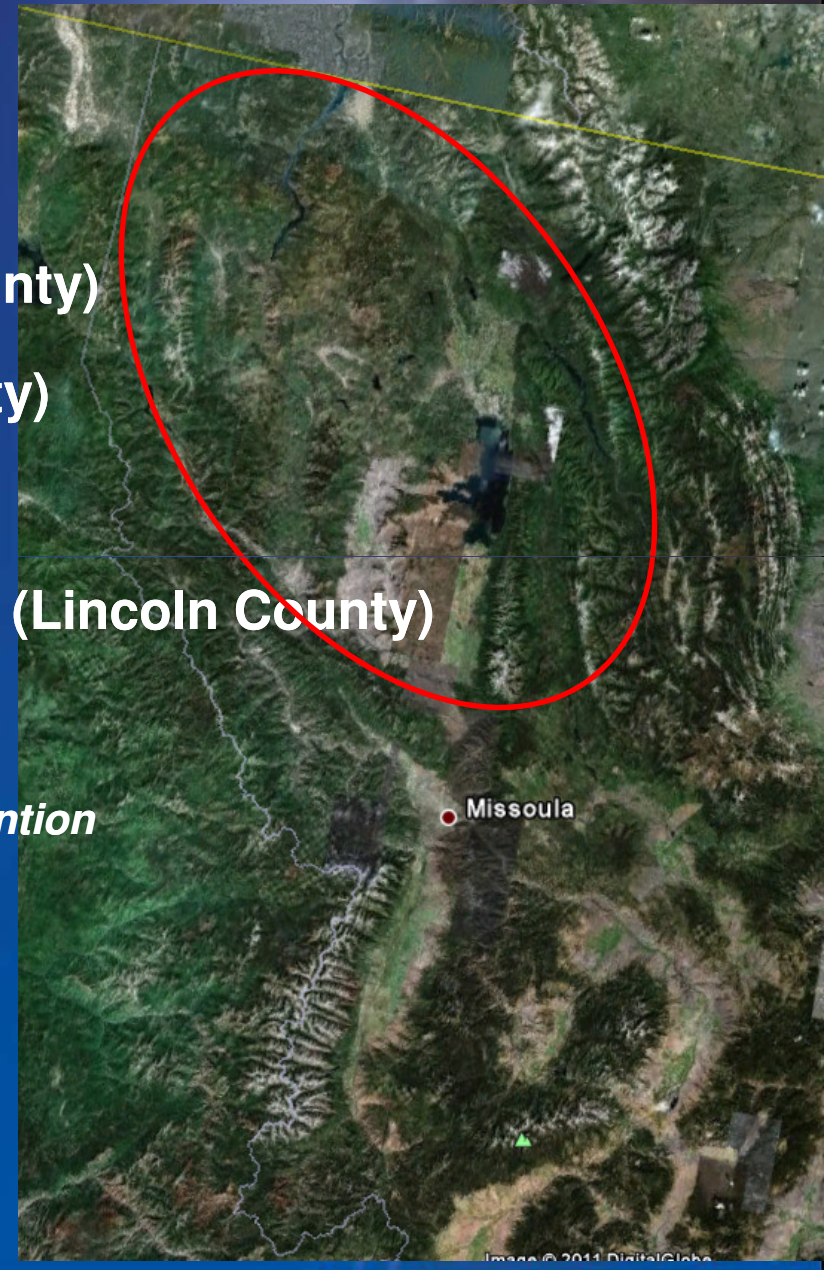
River Locations forecast to Flood

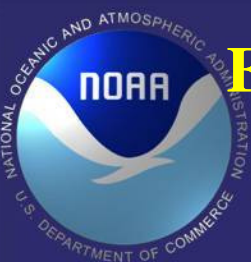
- North Fork Flathead River
- Middle Fork Flathead River
- Mainstem Flathead River
- Stillwater River
- Swan River
- Clark Fork River in Missoula
- Clark Fork River near Plains
- Bitterroot River
- Thompson River
- Little Bitterroot River
- Fisher River
- Yaak River



Small creeks forecast to flood

- **Mission Mountain Creeks (Lake County)**
- **Swan Range Creeks (Flathead County)**
- **Ashley Creek (Flathead County)**
- **Cabinet Mountain Creeks near Libby (Lincoln County)**
- *Many other small creeks too numerous to mention*





Example of Info. on NWS gotomeeting & conference calls

Forecasted Peak Flows

Peak in May or June

Flood Stage = 8.0 ft
Forecast = 8.2 to 8.6 ft

Flooding from small
creeks draining
Cabinet Mountains

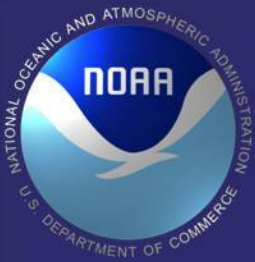
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Road between Libby and Yaak - Elevation = 4200 ft





La Nina 2010-2011

Possible Flooding Analysis

- **Conclusions**

- *La Nina expected to go neutral by June*

- Cooler than average May with above normal precip.
 - June?

- *High Flood Potential for western MT*

- Due to snowmelt



The End

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